

WHAT IS CLAIMED IS:

1. A semiconductor laser apparatus which has a slab waveguide structure extended in one direction, and in which a gain waveguide structure is formed in a direction vertical to said one direction, and in which a first electrode stipulating the gain waveguide along an oscillation optical axis of an optical resonator and a plane-shaped second electrode are disposed so as to face one another, wherein the first electrode is formed so as to have a predetermined angle with respect to the oscillation optical axis.

2. A semiconductor laser apparatus according to claim 1, wherein at least one first electrode other than the first electrode is provided, and the respective electrodes are parallel to each other.

3. A semiconductor laser apparatus according to claim 1, wherein at least one first electrode other than the first electrode is provided, and the respective electrodes are parallel to each other, and a plurality of layers are further laminated.

4. A semiconductor laser apparatus according to claim 2, wherein the first electrode is formed such that, given that W is a width of the first electrode and L is a length of the first electrode, the angle θ is determined by $\theta = \tan^{-1}((W/2)/(L/2))$.

5. A semiconductor laser apparatus according to claim 2, wherein the first electrode includes

a region in which, given that W is a width of the first electrode and L is a length of the first electrode, an inclination which can be defined by $\theta = \tan^{-1}((W/2)/(L/4))$ is provided.

5 6. A semiconductor laser apparatus according to claim 3, wherein the first electrode is formed such that, given that W is a width of the first electrode and L is a length of the first electrode, the angle θ is determined by $\theta = \tan^{-1}((W/2)/(L/2))$.

10 7. A semiconductor laser apparatus according to claim 3, wherein the first electrode includes a region in which, given that W is a width of the first electrode and L is a length of the first electrode, an inclination which can be defined by $\theta = \tan^{-1}((W/2)/(L/4))$ is provided.

15 8. A semiconductor laser apparatus according to claim 2, wherein the inclination of the first electrode is an angle in which a refractive index profile along the direction in which the gain waveguide structure is extended is averaged over the entire optical path length of the oscillation optical axis of the laser beam.

20 9. A semiconductor laser apparatus according to claim 3, wherein the inclination of the first electrode is an angle in which a refractive index profile along the direction in which the gain waveguide structure is extended is averaged over the entire optical path

length of the oscillation optical axis of the laser beam.

10. A semiconductor laser apparatus comprising:

5 a first semiconductor layer which is a plate-shaped p-type semiconductor, and in which a first electrode is formed on an entire surface at one side;

10 a first mirror which is provided at one end in a direction in which a surface of the first semiconductor layer is extended, in a direction perpendicular to the direction in which the surface is extended;

15 a second mirror which is provided at one end in the direction in which the surface of the first semiconductor layer is extended, in a direction perpendicular to the direction in which the surface is extended and so as to be parallel to the first mirror;

20 a second semiconductor layer which is a plate-shaped n-type semiconductor, and which is extended, at one side surface so as to be a predetermined shape, to at least one side of the direction in which said one side surface is extended, and on which a second electrode which is able to face the first electrode is formed, the second electrode being formed so as to have a predetermined angle with respect to a straight line defined due to the first mirror and the second mirror facing one another; and

25 an active layer positioned between a plane facing the plane on which the first electrode of the first

semiconductor layer is formed and a plane facing the plane on which the second electrode of the second semiconductor layer is formed, the active layer outputting light in a direction perpendicular to the plane direction of the first and second semiconductor layers and in a direction parallel to the straight line defined by the first mirror and the second mirror due to a predetermined amount of electric current being supplied to the second electrode.

10 11. A semiconductor laser apparatus according to claim 10, wherein at least one second electrode other than the second electrode is provided, and the respective electrodes are parallel to each other.

15 12. A semiconductor laser apparatus according to claim 10, wherein the angle provided to the second electrode is an angle in which a refractive index profile along the direction in which the active layer is extended can be averaged over the entire area of an optical path on which the light is outputted.

20 13. A semiconductor laser apparatus according to claim 11, wherein, given that W is a width of the second electrode and L is a length of the second electrode, the second electrode is formed so as to have an angle determined by $\theta = \tan^{-1}((W/2)/L)$.

25 14. A semiconductor laser apparatus according to claim 12, wherein, given that W is a width of the second electrode and L is a length of the second

electrode, an angle obtained by the second electrode and the straight line is an angle which is determined by $\theta = \tan^{-1}((W/2)/L)$.

15. A semiconductor laser apparatus comprising:

5 a first semiconductor layer which functions as one cladding layer of an array waveguide, and in which a negative electrode is formed on an entire surface of one side;

10 a first mirror which is provided at one end in a direction to which a surface of the first semiconductor layer is extended, in a direction perpendicular to the direction in which the surface is extended;

15 a second mirror which is provided at one end in the direction in which the surface of the first semiconductor layer is extended, in a direction perpendicular to the direction in which the surface is extended and so as to be parallel to the first mirror;

20 a second semiconductor layer which functions as a second cladding layer facing the first semiconductor layer of the array waveguide, and which is extended, at a surface opposite to the surface facing the first semiconductor layer so as to be a predetermined shape, to at least one side of the direction in which said one side surface is extended, and on which a positive electrode which is able to face the negative electrode
25 is formed, the positive electrode being non-parallel to a straight line defined due to the first mirror and the

second mirror facing one another; and

an active layer positioned between a plane facing the plane on which the first electrode of the first semiconductor layer is formed and a plane facing the plane on which the second electrode of the second semiconductor layer is formed, the active layer outputting light in a direction perpendicular to the plane direction of the first and second semiconductor layers and in a direction parallel to the straight line defined by the first mirror and the second mirror due to a predetermined amount of electric current being supplied to the second electrode.

16. A semiconductor laser apparatus according to claim 15, wherein the positive electrode is a stripe shape.

17. A semiconductor laser apparatus according to claim 16, wherein at least one positive electrode other than the positive electrode is provided, and the respective positive electrodes are parallel to each other.

18. A semiconductor laser apparatus according to claim 16, wherein the positive electrode is formed so as to have an angle in which a refractive index profile along the direction in which the active layer is extended can be averaged over the entire area of an optical path on which the light is outputted.

19. A semiconductor laser apparatus in which

a plurality of cladding layers are laminated; a first electrode having a predetermined width and a second electrode whose width is greater than the width of the first electrode are disposed so as to face one another via the respective cladding layers; a laminating direction of the respective cladding layers at cementing portions of the respective cladding layers is made to be a slab waveguide structure; and a direction vertical to the laminating direction is made to be a gain waveguide structure, and which oscillates a laser beam in these waveguide structures, wherein the first electrode is formed so as to be inclined with respect to an oscillation optical axis of the laser beam.

20. A stack type semiconductor laser apparatus in which a plurality of cladding layers are laminated; a plurality of first electrodes respectively having predetermined widths and a second electrode whose width is greater than the respective widths of the first electrodes are disposed so as to face one another via the respective cladding layers; and a laminating direction of the respective cladding layers at cementing portions of the respective cladding layers is made to be a slab waveguide structure, and which has a plurality of semiconductor lasers forming emission points of a plurality of laser beams due to a direction vertical to the laminating direction being made to be a gain waveguide structure, and which is formed by

laminating said plurality of semiconductor lasers,
wherein said plurality of first electrodes are
respectively formed so as to be inclined with respect
to an oscillation optical axes of the laser beams.